# Anti-staphylococcal treatment in dermatitis

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## Abstract

***Question*** A 10-year-old boy with atopic dermatitis (AD) came for consultation with an exacerbation. He suffered from pruritus and multiple erythematous skin lesions, identified as inflamed but not infected. Because skin colonization with *Staphylococcus aureus* is very common in AD and can worsen the skin condition, is it reasonable to add topical antibiotic treatment to the anti-inflammatory treatment in this case?

***Answer*** Skin colonization with *S aureus* is prevalent in children and adults with AD, and can aggravate skin inflammation. Although topical combination creams with steroids and antibiotics are widely used for AD flare-ups, their superiority over anti-inflammatory treatment alone is not well established. Antibiotic treatment, whether systemic or topical, should be reserved for cases in which explicit signs of infection are present.

## Résumé

***Question*** Un garçon de 10 ans est venu en consultation pour une exacerbation de dermatite atopique (DA). Il avait un prurit et de multiples lésions érythémateuses de la peau, dont on a déterminé qu'elles étaient enflammées mais non infectées. Parce que la colonisation de la peau par des *Staphylococcus aureus* est très fréquente dans la DA et qu'elle peut aggraver le problème de peau, est-il raisonnable de prescrire un traitement antibiotique topique en plus du traitement anti-inflammatoire dans ce cas?

***Réponse*** La colonisation de la peau par les *S aureus* est fréquente dans les cas de DA chez l'enfant et chez l'adulte et peut aggraver l'inflammation de la peau. Bien qu'une combinaison de crèmes topiques avec stéroïdes et antibiotiques soit largement utilisée pour une flambée de DA, leur supériorité par rapport à un traitement anti-inflammatoire seulement n'est pas bien établie. Le traitement aux antibiotiques, systémique ou topique, devrait être réservé aux cas où des signes explicites d'infection sont présents.


Atopic dermatitis (AD) is a common, chronic, relapsing skin disease related to inflammatory dermatologic changes that are clinically characterized by pruritus and erythematous patches and plaques with a typical morphology and distribution.[1] The disease manifests during infancy for most patients with AD, and the reported prevalence among children is 17% to 20%.[2]

## *Staphylococcus aureus* colonization

Colonization of the skin with *Staphylococcus aureus* is very common in AD, and the pathogen can be isolated from 80% to 100% of atopic skin lesions, most without clinical signs of infection.[3] The increased colonization by *S aureus* in patients with AD might be caused by enhanced adherence of *S aureus* to atopic skin, as its cell walls exhibit receptors (adhesins) for dermal fibronectin and fibrinogen, which are uncovered in the damaged atopic skin.[4] Moreover, it has been demonstrated that endogenous antimicrobial peptides are decreased in the atopic skin, suggesting that defects in innate immune responses also account for the susceptibility of patients with AD to *S aureus* colonization.[5]

The bacterial colonization is well recognized as an important exacerbation factor that can promote AD flare-up.[6-9] The density of *S aureus* has been shown to correlate with cutaneous inflammation and severity of eczema.[6] Exacerbation might be due to a direct chemical irritation of protein components of the bacterium with immune cells.[7] *Staphylococcus aureus* also secretes a group of toxins (superantigens), which are capable of stimulating large populations of T lymphocytes distant from the eczematous site, giving rise to widespread activation of existing lesions.[8] Correlation has been found between the presence of superantigens and the severity of AD.[8]

## Antibiotic treatment

The growing knowledge of the role of *S aureus* in exacerbating AD contributes to a plausible rationale for use of antibiotics when treating AD even without signs of clinically infected lesions. However, existing evidence of the clinical benefits of anti-staphylococcal agents appears to be conflicting.[9-15]

Although antibiotic treatment usually reduces or totally eliminates *S aureus* colonization, clinical improvement is not consistent or sustained, and recolonization usually accrues within 4 to 8 weeks.[9]

In a controlled trial from the United Kingdom, treatment of 50 children with AD and clinically noninfected lesions with oral floxacillin versus placebo reported no significant difference in clinical score after 4 weeks of treatment.[10] Similar results were reported when oral cefadroxil was compared with placebo for treatment of lesions defined as "superinfected" in a trial involving 33 children with AD.[11] Topical antiseptics (such as triclosan, chlorhexidine, or crystal violet) or antibiotic skin creams (eg, fucidin, mupirocin) are frequently prescribed to treat acute flares with clinical signs of bacterial impetiginization.

Several studies report improvement of clinical scores after treatment.[12-14] The use of crystal violet as a topical agent led to improvement in *S aureus*–colonized AD.[12] Topical application of retapamulin also led to improvement of atopic skin lesions.[13] The use of topical mupirocin was shown to reduce *S aureus* colonization and, in the short term, improve clinical scores.[14] Nevertheless, improvement was temporary and carried the risk of potential adverse events such as contact dermatitis and enhanced drug resistance.[15]

*Staphylococcus aureus*–associated resistance has been recognized as a growing problem. A report indicated that resistance levels to fucidin increased from 2% in the past decade to 10% to 38%.[9] In the face of increased prevalence of antibiotic resistance and the lack of satisfactory data on benefits, long-term use of systemic or topical antibiotics for AD is not recommended.[15,16] When overt signs of bacterial superinfection are present on skin lesions, short-term use of oral or topical antibiotics is justified.[15]

## Steroids and combined treatments

Topical steroids are widely used for treatment of AD flare-ups. Several studies demonstrated that local steroid treatment, even without antibiotics, can substantially reduce *S aureus* colonization.[17-20] In a large, multicentre, double-blind, randomized controlled trial, 123 children and 204 adults with AD and eczema received topical combination therapy (hydrocortisone butyrate plus mupirocin) or topical steroids (hydrocortisone butyrate) for 28 days. In both groups, *S aureus* colonization decreased substantially after 7 days of treatment and treatment correlated with clinical improvement. In a subgroup of moderate to severe AD, the therapeutic effect of early combined therapy was superior to that in the steroid-only group; however, on day 14 and at the end of the treatment period, there was no significant difference between the 2 treatment groups in clinical scoring.[17] Two other randomized controlled trials confirmed these results.[18,19] Hung et al compared treatment with fluticasone or tacrolimus with or without fusidic acid in 60 children with AD.[18] Schuttelaar et al from the Netherlands assessed the efficacy of the addition of tetracycline to triamcinolone acetonide in 44 adults.[19] In both trials, although bacterial eradication was better when topical antibiotics were added to the anti-inflammatory cream, clinical outcome did not differ significantly. The few studies that included clinically infected lesions also failed to demonstrate long-term clinical superiority of the combined therapy.[15]

## Other anti-staphylococcal strategies

In recent years, a special silk fabric has shown therapeutic effect in the treatment of AD. This fabric (DermaSilk) is made of sericin-free silk fibres treated with Aegis AEM 5772/5, a durable antimicrobial substance. A randomized, double-blind study evaluated the clinical effect of silk fabric with and without the antimicrobial coating by comparing right arms with left arms of 30 children and adults with AD.[20] The clinical scores of skin areas covered with the coated silk were substantially better than the scores for the unmodified silk after 3 and 4 weeks of treatment.[20] Another randomized controlled study in 30 children with mild to moderate AD reported no difference in clinical score between DermaSilk and the uncoated silk.[21] Moreover, although Aegis AEM 5772/5 has potent antimicrobial effect in vitro, its in vivo effect on *S aureus* colonization was mild, suggesting that clinical improvement was probably owing to protective barrier function.[20] Although promising, the effectiveness of coated silk fabric in treatment of AD is yet to be proven by larger-scale studies.

The use of antibacterial bath additives and antibacterial soaps resulted in conflicting findings and cannot be recommended as a sole therapy at this time.[15]

## Conclusion

Skin colonization with *S aureus* is prevalent in children and adults with AD, and it is known to aggravate skin inflammation. Nevertheless, long-term use of topical or systemic antibiotics does not seem to be beneficial in AD, and carries risks of adverse events and emergence of resistant bacteria. Such treatment alone or combined with anti-inflammatory treatment should be reserved for children with overt signs of bacterial superinfection on the skin.

**Competing interests**
None declared

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